

1-40. (CANCELED).

41. (NEW) An apparatus for operating a gate, comprising:

a closing mechanism including a restoring spring connected to the gate for exerting a closing force to move the gate to a closed position,

a gate opening mechanism including a gate opening hydraulic cylinder and piston connected to the gate for exerting an opening force against the closing force exerted by the restoring spring to move the gate to an open position when actuated by a gate opening pressure, and

a ground mounted pressure generating unit for generating a gate actuation pressure in response to a gate actuation force applied to the pressure generating unit, including

a primary compression hydraulic cylinder actuated by the gate actuation force for generating the gate actuation pressure wherein the gate actuation pressure includes a gate opening pressure and an overpressure, wherein

the gate opening hydraulic cylinder and piston are connected from the primary compression hydraulic cylinder and are actuated by the gate opening pressure of the gate actuating pressure to move the gate to the open position,

an accumulator tank connected from the primary compression hydraulic cylinder through an overpressure valve to accumulate the overpressure so that only the gate opening pressure is applied to the gate opening hydraulic cylinder and piston, and

an expansion tank connected from the accumulator tank through a time delay/overpressure valve for a time delayed discharge of the accumulated overpressure from the accumulator tank to the expansion tank for subsequent discharge of the overpressure from the expansion tank, wherein

a time delay of the time delay/overpressure valve is selected so that the discharge of the accumulated overpressure from the accumulator tank to the expansion tank occurs only after a selected time after release of the gate actuation force from the ground mounted pressure generating unit.

42. (NEW) The apparatus according to claim 41, wherein the apparatus further comprises a lock mechanism to lock the gate in a closing position and which is inactivated in an initial phase by an opening movement of a lock plunger actuated by the gate actuation pressure generated by the ground mounted pressure generating unit.

43. (NEW) The apparatus according to claim 41, wherein the ground mounted pressure generating unit further comprises:

a pressure generating unit enclosure, including

an enclosure box having an open top and a closed bottom,

a compression actuation box having an open bottom and a closed top,

wherein

the compression actuation box fits within the enclosure box to allow vertical telescopic motion of the primary compression actuation box within the enclosure box, and wherein

the primary compression hydraulic cylinder is mounted between the compression actuation box and the enclosure box such that

the gate actuation force applied to the closed top of the compression actuation box through the open top of the enclosure box will result in vertical telescopic depression of the compression actuation box within the enclosure box and application of the gate actuation force to the primary compression hydraulic cylinder to generate the gate actuation pressure,

the pressure generating unit enclosure further including

compression springs mounted between the compression actuation box and the enclosure box to apply an upward force to urge the primary compression box upward to an undepressed position until the downward gate actuation force exceeds the upward force of the compression springs, and

ground mount legs and fasteners extending from the enclosure box to mount the pressure generating unit enclosure to a ground surface.

44. (NEW) The apparatus according to claim 41, further including:

a second ground mounted pressure generating unit located on an opposite side of the gate from the ground mounted pressure generating unit and connected to actuate the gate in a manner similar to the ground mounted pressure generating unit.

45. (NEW) The apparatus according to claim 43, further including:

a threshold mounted on an outer edge of an upper side of the closed top of the compression actuation box to detect and establish a presence of a vehicle in a running over-position wherein the vehicle will depress the compression actuation box and generate the gate actuation pressure, and

a ramp plate articulately fastened adjacent an upper outer side of the compression actuation box to assist a vehicle wheel in rolling onto the upper side of the compression actuation box.

46. (NEW) The apparatus according to claim 41, further comprising:

a vertically extending gate support member, wherein

the gate is pivotably mounted to the gate support member,

a holder attached to and extending from the gate support member in a direction generally perpendicular to a plane of the gate and to a holder pivot end, and

a force arm attached to and extending generally parallel to the gate and in the direction of the gate support member to a force arm pivot end that is offset from the plane of the gate, wherein

a first end of the gate opening hydraulic cylinder is pivotably connected to the holder pivot end, and

a second end of the gate opening hydraulic cylinder is pivotably connected to the force arm pivot end, wherein

the gate opening hydraulic cylinder lies in a first plane spaced above the holder,

the force arm lies in a second arm spaced above the first plane, and wherein

the force arm is shaped as a curve between the gate and the force arm pivot end so as to arc around the gate support member and to avoid contact between the force arm and the gate support member during motion of the gate between the gate open position and the gate closed position.

47. (NEW) The apparatus according to claim 43, wherein:

when the gate has been opened and the time delay of the time delay/overpressure valve has elapsed,

the upward force exerted by the compression springs on the compression actuation box and thereby on the primary compression hydraulic cylinder will cause the primary compression hydraulic cylinder to move upward to the undepressed position to thereby cause an underpressure in the primary compression hydraulic cylinder, resulting in

a draw-back of fluid from the expansion tank to the accumulator tank, preparing the accumulator tank for a next actuation of the gate, and

a reduction in pressure in the gate opening hydraulic cylinder by a flow of hydraulic fluid from the gate opening hydraulic cylinder and through the time delay/overpressure valve to the expansion tank, allowing the restoring spring to move the gate to the closed position.

48. (NEW) The apparatus according to claim 41, further comprising:

a first aerator in a path between the primary compression hydraulic cylinder and the accumulator tank,

a second aerator (M) in a path between the accumulator tank and the gate opening hydraulic cylinder opening cylinder,

a first check valve in a path between the primary compression hydraulic cylinder and the expansion tank,

a second check valve in the path between the primary compression hydraulic cylinder and the accumulator tank, and

a manometer and a third aerator connected in a path between the second check valve and the accumulator tank.

49. (NEW) The apparatus according to claim 43, further comprising:

a pressure generating unit membrane enclosure for at least partial protection from moisture and dirt, including

a lower reinforced plastic fabric membrane extending beneath the pressure generating unit, and

an upper steel net-reinforced rubber mat extending over the pressure generating unit.

50. (NEW) The apparatus according to claim 43, wherein:

the enclosure box and the compression actuation box of the pressure generating unit include a mutual bearing that allows only vertical movements of the compression actuation box within the enclosure box, and wherein

the ramp plate is articulately fastened to the compression actuation box such that a first end of the ramp plate articulately fastened to the compression actuation box remains in a fixed vertical plane as the compression actuation box is depressed into the enclosure box by a vehicle while a second end of the ramp plate moves horizontally outwards relative to the enclosure box and wherein a maximum outward movement of the second end of the ramp plate is reached when the ramp plate is substantially parallel to the ground surface.

51. (NEW) The apparatus according to claim 50, wherein the pressure generating unit resides in a first module having two plastic hoses for respectively transferring the gate opening pressure to the gate opening hydraulic cylinder and returning hydraulic liquid from the expansion tank to the primary compression hydraulic cylinder primary when an underpressure occurs in the primary compression hydraulic cylinder,

the accumulator tank, the pressure meters, the expansion tank and the overpressure valve and the time delay/overpressure valve reside in a second module, and

the gate opening hydraulic cylinder, the restoring spring, the holder, and the force arm reside a third module attachable to the gate support member.

52. (NEW) The apparatus according to claim 41, wherein the apparatus further comprises:

a manual operation check valve connected between the accumulator tank and a closing side of the gate opening hydraulic piston, whereby

when the gate is in the open position,

a manual actuation of the manual operation check valve will apply the overpressure accumulated in the accumulator tank to the closing side of the piston of the gate opening hydraulic piston, so that

the overpressure from the accumulator tank in combination with the closing force of the restoring spring pressure will move the gate to the closed position, whereupon

the manual operation check valve will lock the gate in the closed position by maintaining the overpressure on the closing side of the piston of the gate opening hydraulic piston.

53. (NEW) The apparatus according to claim 52, wherein:

when the gate is in the closed position,

a manual actuation of the manual operation check valve will open the manual operation check valve to allow a flow of hydraulic fluid from the closed side of the gate opening hydraulic piston to an open side of the gate opening hydraulic piston as the gate is manually moved to the open position,

10/018,421

thereby equalizing differential hydraulic pressure areas and differential hydraulic pressures between the open and closed sides of the gate opening hydraulic cylinder when the gate has reached the open position, and

when the gate is in the open position after a manual opening of the gate,  
the closing force exerted by the restoring spring will automatically move the gate to the closed position.

54. (NEW) The apparatus according to claim 52, further comprising:

a first choke connected between the primary compression hydraulic cylinder and the gate opening hydraulic cylinder and piston, and

a second choke connected between the first choke and the accumulator tank, such that

when the gate actuation force acts upon the primary compression hydraulic cylinder the gate actuation pressure flows through the first choke, and

the gate opening pressure flows to the gate opening hydraulic cylinder while the overpressure flows through the second choke to the accumulator tank, and wherein

the first choke has a flow capacity higher than a flow capacity of the second choke such that the gate will move to the open position under the gate opening pressure before a discharge of the overpressure to the accumulator tank, wherein

when the gate is moving to the open position,

the gate opening hydraulic cylinder is correspondingly moving to a negative position,

a volume of hydraulic fluid on a positive side of the gate opening hydraulic cylinder and a volume of hydraulic fluid in the accumulator tank are together sufficient to fill the primary compression hydraulic cylinder to an operation level, and

when the gate is in the open position the manual operation check valve is held in the open position by a hydraulic pressure exerted by a negative side of the gate opening hydraulic cylinder, and

the time delay/overpressure valve connected between the accumulator tank and the expansion tank and opening at a differential pressure between the accumulator tank and the expansion tank greater than a selected differential pressure such that an overpressure accumulation in the accumulator tank due to repeated actuation of the primary compression hydraulic cylinder resulting in an accumulated overpressure

10/018,421

exceeding the selected differential pressure will result in a discharge of the accumulated overpressure into the expansion tank.